

REMARKS

The Final Office Action mailed November 20, 2002, has been received and reviewed. Claims 1 through 53 are currently pending in the application. Claims 1 through 23, 25 through 27 and 29 through 53 stand rejected. Claims 24 and 28 have been objected to as being dependent upon rejected base claims, but the indication of allowable subject matter in such claims is noted with appreciation. Claims 24 and 28 have been canceled and the elements therein are proposed to be incorporated into independent claims 1 and 27 respectively. Applicants propose to amend claims 1, 6, 27 and 33. Reconsideration is respectfully requested.

Supplemental Information Disclosure Statement

Please note that a Supplemental Information Disclosure Statement was filed herein on February 27, 2002, and that no copy of the PTO-1449 was returned with the outstanding Office Action. Applicants respectfully request that the information cited on the PTO-1449 be made of record herein. For the sake of convenience, a second copy of the February 27, 2002, Supplemental Information Disclosure Statement, PTO-1449 with copy of cited references, and USPTO date-stamped postcard are enclosed herewith. It is respectfully requested that an initialed copy of the PTO-1449 evidencing consideration of the cited references be returned to the undersigned attorney.

35 U.S.C. § 112 Claim Rejections

Claims 6 and 33 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, it was stated that the specification fails to teach how the height detection system taken alone levels the exposed surface of adhesive material. Applicants respectfully traverse this rejection and respectfully submit that the specification states with respect to FIGs. 11 & 12, “[a] height detection mechanism, shown as a light (preferably a laser) transmitter 140 and a light receiver 142 is used to determine the height of the exposed surface 122. The control

signal 144 from control system 200 triggers the pump 132 to stop or a valve (not shown) to shut when the desired exposed surface height is achieved." (See, Specification, page 13, paragraph 46).

However, in an effort to expedite prosecution, applicants propose to amend claims 6 and 33 to recite "a height detection mechanism and control system". Support for the proposed amendment may be found in the as-filed specification, for example, at page 13, paragraph [0046]. Reconsideration and withdrawal of the rejection is requested.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent 5,185,040 to Sakai et al.

Claims 1-23, 25-27 and 29-53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakai et al.(U.S. Patent 5,185,040). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Sakai discloses an electrode paste reservoir 4 having a slotted plate 3 wherein electrode paste 2f is forced upwardly through slits 3a and introduced to at least three surfaces of an electronic component 1 having an end surface 1a and major surfaces 1b and 1c which are in series with end surface 1a. (Sakai, FIG. 3). When end surface 1a and associated major surfaces, 1b and 1c, are introduced to electrode solder paste 2f, that has been forced through slits 3a, a U-shaped electrode is formed on end surface 1a and associated major, or side, surfaces 1b and 1c. (Sakai, FIG. 5).

Applicant respectfully submits that Sakai fails to teach or suggest every element of the presently claimed invention. Independent claim 1 of the presently claimed invention recites: an “apparatus for applying adhesive material to one or more underside surfaces of at least one semiconductor component, comprising: an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above said at least one upward facing opening, said adhesive material having a surface tension; and at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material at said precise location above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially constant height, said at least one mechanism including at least a pump configured to supply said adhesive material to said adhesive reservoir and a control system to control said supply of said adhesive material to said adhesive reservoir to control extrusion of said adhesive material to a selectable height.”

The Examiner has acknowledged that dependent claim 24 would be allowable if placed in independent form. Applicants respectfully submit that claim 1 as proposed to be amended includes the elements of claim 24. Thus, it is acknowledged that Sakai fails to teach or suggest “said at least one mechanism including at least a pump configured to supply said adhesive material to said adhesive reservoir and a control system to control said supply of said adhesive material to said adhesive reservoir to control extrusion of said adhesive material to a selectable height” as recited in claim 1 of the presently claimed invention. Further, applicant respectfully submits that Sakai fails to provide any mechanism for *leveling* an exposed surface of the electrode paste, or *maintaining* a height thereof. As Sakai fails to teach or suggest every element of claim 1 of the presently claimed invention, applicants submit that claim 1 avoids Sakai. As such, claim 1 is allowable.

Claims 2 through 23 and 25 through 26 are each allowable as depending, either directly or indirectly, from allowable claim 1.

Claim 2 is further allowable as Sakai lacks any teaching or suggestion of the at least one upward facing opening, in combination with said surface tension or said adhesive material, being configured to provide an exposed surface comprising a meniscus. Instead, the disclosure lacks any description of a meniscus and the figures in Sakai appear to depict application of electrode paste having substantially constant surfaces rather than menisci.

Claim 3 is further allowable as Sakai fails to teach or suggest that the at least one mechanism is configured to manipulate the surface tension of an adhesive material to flatten the exposed surface of the adhesive material. Further, applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai fails to teach or suggest a mechanism for maintaining the adhesive material at a substantially constant height.

Claim 4 is further allowable as Sakai fails to teach or suggest that the at least recited one mechanism is configured to manipulate the difference in pressure within an adhesive material and ambient air to be equal to twice the surface tension of the adhesive material divided by a radius of curvature of the adhesive material. Further, applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai fails to teach or suggest manipulating the difference in pressure and fails to teach or suggest a mechanism for maintaining the adhesive material at a substantially constant height.

Claim 5 is further allowable as Sakai fails to teach or suggest that the at least one recited mechanism is configured to use the surface tension of an adhesive material to control surface area and thickness of the adhesive material available for application to said at least one semiconductor component. Applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai fails to teach or suggest controlling

the surface area and thickness or the adhesive material and fails to teach or suggest a mechanism for maintaining the adhesive material at a substantially constant height.

Claim 7 is further allowable as Sakai fails to teach or suggest that the at least one recited mechanism comprises a coating stencil including a generally flat and generally horizontal top surface; and a plurality of apertures aligned to wet said defined portion of said at least one semiconductor component with an adhesive material, said plurality of apertures sized and configured to control extrusion of the adhesive material through said coating stencil to increase the exposed surface of the adhesive material. Instead, Sakai lacks any teaching or suggestion that the stencil could be configured to precisely apply adhesive material to semiconductor component.

Claim 11 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be positioned substantially parallel to each other and is spaced so as to have a centerline pitch between each aperture of said plurality of apertures of .020 inches (.051 cm).

Claim 12 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil number 23 in quantity.

Claim 13 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 14 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be sized and configured as a result of considering adhesive material viscosity.

Claim 15 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be sized and configured to suit an adhesive material viscosity ranging from approximately 1000 to 500,000 centipoise.

Claim 16 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be sized and configured to optimally accommodate an adhesive material viscosity of approximately 62,000 centipoise.

Claim 17 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be sized and configured to optimally accommodate an adhesive

material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

Claim 18 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be arranged generally parallel to each other and be spaced so as to have a centerline pitch between each aperture of said plurality of apertures of .020 inches (.051 cm).

Claim 19 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil number 23 in quantity.

Claim 20 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil is .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 21 is further allowable as Sakai fails to teach or suggest a vacuum on a bottom side of a coating stencil. Instead, Sakai discloses suction through an outlet in a vacuum chamber. (Sakai, FIG. 7).

Claim 22 is further allowable as Sakai fails to teach or suggest that the at least one second mechanism be configured to bring a defined portion of at least one semiconductor component in contact with an exposed surface of adhesive material.

Claim 23 is further allowable as Sakai fails to teach or suggest that the adhesive reservoir further comprises an adhesive circulation mechanism configured to circulate an adhesive material and maintain uniformity of the adhesive material. Further, applicant respectfully submits it has not admitted that it is conventional to provide a circulating mixing reservoir.

Claim 25 is further allowable as Sakai fails to teach or suggest the at least one mechanism is attached to the adhesive reservoir.

Claim 26 is further allowable as Sakai fails to teach or suggest the at least one semiconductor component comprises at least one lead finger of a lead frame.

Independent claim 27 of the presently claimed invention is allowable for substantially the same reasons as independent claim 1. Claim 27 as proposed to be amended recites an "apparatus for applying viscous material to one or more underside surfaces of at least one semiconductor component, comprising: a reservoir for providing an exposed surface of viscous material to only

one or more underside surfaces of at least a portion of at least one semiconductor component positioned thereover, said reservoir comprising at least one pool chamber in fluid communication with a viscous inflow chamber, said at least one pool chamber defined by at least one upward facing opening, said reservoir shaped such that the exposed surface of viscous material is supplied to a precise location above said at least one upward facing opening, said viscous material having a surface tension; at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one upward facing opening, said at least one first mechanism comprising at least a pump for supplying said viscous material to said reservoir and a control system for controlling said supply of the viscous material to said reservoir; and at least one second mechanism associated with said reservoir, said at least one second mechanism configured to level said exposed surface of viscous material above said at least one upward facing opening, to maintain said exposed surface of viscous material at a substantially constant height and to increase the effective exposed surface of viscous material."

The Examiner has acknowledged that dependent claim 28 would be allowable if placed in independent form. Applicants respectfully submit that claim 27 as proposed to be amended includes the elements of claim 28. Thus, it is acknowledged that Sakai fails to teach or suggest "said at least one first mechanism comprising at least a pump for supplying said viscous material to said reservoir and a control system for controlling said supply of the viscous material to said reservoir;" as recited in claim 27 of the presently claimed invention.

Sakai also lacks any teaching or suggestion of both at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one upward facing opening *and* at least one second mechanism configured to level said exposed surface of viscous material above said at least one upward facing opening and maintain said exposed surface of viscous material at a substantially constant height and to increase the effective exposed surface of viscous material. As Sakai fails to teach or suggest every element of the presently claimed invention, applicant respectfully submits that claim 27 of the presently claimed invention is not rendered obvious by Sakai. Accordingly, claim 27 is allowable.

Claims 29 through 53 are further allowable as depending, either directly or indirectly, from allowable claim 27.

Claim 29 is further allowable as Sakai lacks any teaching or suggestion of the at least one upward facing opening, in combination with said surface tension or said adhesive material, being configured to provide an exposed surface comprising a meniscus. Instead, the disclosure lacks any description of a meniscus and the figures in Sakai appear to depict application of electrode paste having substantially constant surfaces and lacking menisci.

Claim 30 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to manipulate surface tension of a viscous material to flatten out the exposed surface of the viscous material. Applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai fails to teach or suggest a mechanism for maintaining the adhesive material at a substantially constant height.

Claim 31 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to manipulate the difference in pressure within a viscous material and ambient air to be equal to twice the surface tension of the viscous material divided by a radius of curvature of the viscous material. Applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai lacks any teaching or suggestion of manipulating the difference in pressure and fails to teach or suggest a mechanism for maintaining the adhesive material at a substantially constant height.

Claim 32 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to use surface tension of a viscous material to control surface area and thickness of the viscous material available for application to at least one semiconductor component. Applicant respectfully disagrees with the statement that the “Sakai et al stencil plate manipulates/uses surface tension in the manner set forth in the claims since it provides the same result-substantially level height of adhesive which is applied to the substrate”. (Paper No. 8, page 4). Instead, applicant submits that Sakai lacks any teaching or suggestion of controlling the surface area and thickness of the adhesive material and fails to teach or suggest a mechanism for

maintaining the adhesive material at a substantially constant height.

Claim 34 is further allowable as Sakai fails to teach or suggest that the at least one second mechanism comprises a coating stencil including a generally flat and generally horizontal top surface; and a plurality of apertures aligned to wet said defined portion of said at least one lead finger of a lead frame with an adhesive material, said plurality of apertures sized and configured to control extrusion of the adhesive material through said coating stencil to increase the exposed surface of the adhesive material. Instead, Sakai lacks any teaching or suggestion that the stencil could be configured to precisely apply adhesive material to a lead finger on a lead frame.

Claim 36 is further allowable as Sakai fails to teach or suggest the plurality of openings of said at least one coating stencil is configured to apply said viscous material to only a selected portion of said at least one lead finger.

Claim 39 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be positioned generally parallel to each other and is spaced so as to have a centerline pitch between each opening of the plurality of openings of .020 inches (.051 cm).

Claim 40 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil number 23 in quantity.

Claim 41 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 42 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured as a result of considering viscous material viscosity.

Claim 43 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to manage a viscous material viscosity ranging from approximately 1000 to 500,000 centipoise.

Claim 44 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise.

Claim 45 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

Claim 46 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be arranged generally parallel to each other and be spaced so as to have a centerline pitch between each opening of said plurality of openings of .020 inches (.051 cm).

Claim 47 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil number 23 in quantity.

Claim 48 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 50 is further allowable as Sakai fails to teach or suggest at least one third mechanism configured to bring at least one lead finger in contact with an exposed surface of viscous material.

Claim 51 is further allowable as Sakai fails to teach or suggest a circulation mechanism configured to circulate a viscous material and maintain uniformity of the viscous material. Further, applicant respectfully submits it has not admitted that it is conventional to provide a circulating mixing reservoir.

Claim 52 is further allowable as Sakai fails to teach or suggest the at least one second mechanism is attached to said reservoir.

Claim 53 is further allowable as Sakai fails to teach or suggest the at least one semiconductor component comprises at least one lead finger of a lead frame.

Objections to Claims 24 and 28/Allowable Subject Matter

Applicant notes with appreciation that claims 24 and 28 stand objected to as being dependent upon rejected base claims, but are indicated to contain allowable subject matter and would be allowable if placed in appropriate independent form. Applicant respectfully submits claims 24 and 28 have been canceled and the elements of claims 24 and 28 are proposed to be

incorporated into independent claims 1 and 27 respectively. As the Examiner previously indicated that claims 24 and 28 would be allowable if placed in appropriate independent form, applicant submits that claims 1 through 23, 25 through 27 and 29 through 53 are in condition for allowance.

ENTRY OF AMENDMENTS

The proposed amendments to claims 1, 6, 27 and 33 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search and will reduce the issues on appeal. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1 through 23, 25 through 27 and 29 through 53 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, she is respectfully invited to contact applicants' undersigned attorney.

Respectfully submitted,



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Enclosure: Version With Markings to Show Changes Made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended three times) An apparatus for applying adhesive material to one or more underside surfaces of at least one semiconductor component, comprising:
an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above said at least one upward facing opening, said adhesive material having a surface tension; and
at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material at said precise location above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially constant height, said at least one mechanism including at least a pump configured to supply said adhesive material to said adhesive reservoir and a control system to control said supply of said adhesive material to said adhesive reservoir to control extrusion of said adhesive material to a selectable height.

6. (Amended) The apparatus of claim 1, wherein said at least one mechanism comprises at least one of a coating stencil, a pump and control system, a wiper, a vacuum, and a height detection mechanism and control system.

Please cancel claim 24 without prejudice or disclaimer.

27. (Amended three times) An apparatus for applying viscous material to one or more underside surfaces of at least one semiconductor component, comprising:
a reservoir for providing an exposed surface of viscous material to only one or more underside surfaces of at least a portion of at least one semiconductor component positioned

thereover, said reservoir comprising at least one pool chamber in fluid communication with a viscous inflow chamber, said at least one pool chamber defined by at least one upward facing opening, said reservoir shaped such that the exposed surface of viscous material is supplied to a precise location above said at least one upward facing opening, said viscous material having a surface tension;

at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one upward facing opening, said at least one first mechanism comprising at least a pump for supplying said viscous material to said reservoir and a control system for controlling said supply of the viscous material to said reservoir; and at least one second mechanism associated with said reservoir, said at least one second mechanism configured to level said exposed surface of viscous material above said at least one upward facing opening, to maintain said exposed surface of viscous material at a substantially constant height and to increase the effective exposed surface of viscous material.

Please cancel claim 28 without prejudice or disclaimer.

33. (Amended) The apparatus of claim 27, wherein said at least one second mechanism comprises at least one of a coating stencil, a wiper, a vacuum, and a height detection mechanism and control system.